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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

## Seasonal Food Habits of Mule Deer in Southeastern Wyoming<sup>1</sup>

Gregory A. Goodwin<sup>2</sup>

Mule deer diets (as determined by fecal analyses) consisted of 87.6 percent browse, 5.6 percent graminoids, and 6.6 percent forbs. Ground cover analysis revealed 16.2 percent browse, 6.5 percent graminoids, 3.2 percent forbs, and 74.1 percent bare ground. The diet varied with seasons. Deer ate as much as 19 percent graminoids in May, 36 percent forbs in June, and 96 percent browse in winter. The most important diet species were big sagebrush, antelope bitterbrush, and true mountainmahogany.

**Keywords:** *Odocoileus hemionus*, *Artemisia tridentata*, *Purshia tridentata*, *Cercocarpus montanus*, wildlife food habits.

The mule deer (*Odocoileus hemionus*) is an important game species in Wyoming. To plan proper management of any mule deer population, information is needed on food habits as well as food availability under constantly changing conditions.

A particular species may be a preferred food on one range, while a different species may be preferred on another. There are also wide variances in food preferences from one geographical area to another (Kufeld et al. 1973). This study was conducted to determine seasonal food habits of mule deer and vegetation available for food in southeastern Wyoming.

The study area consisted of the entire Pole Mountain District of the Medicine Bow National Forest, located 10 miles east of Laramie, Wyoming. It contains approximately 88 square miles between the elevations of 7,500 and 9,055 feet. The vegetation of the area can be divided into four broad categories: coniferous forest, mixed shrub, grassland, and

meadow bottoms. Mule deer feeding sites are located generally in the mixed shrub type dominated by big sagebrush (*Artemisia tridentata*), antelope bitterbrush (*Purshia tridentata*), and true mountainmahogany (*Cercocarpus montanus*).

### Methods

Food habits data were obtained using a micro-technique method on fresh fecal material. Samples were collected at 2-week intervals from December 1971 through May 1973.

A total of 328 fecal samples (20 pellets per fecal group) were collected from 21 feeding sites (areas where mule deer were observed feeding more than once). Vegetation analyses, to determine availability, were made on 18 of the feeding sites from June 1972 through May 1973, using a canopy coverage method (Daubenmire 1959). Vegetation was classified as browse, forb, or graminoid. Plant specimens were taken during field measurements to form a reference collection for identifying plant species in the fecal material.

In the laboratory, the fecal samples for each 2-week sample period were placed in a blender and pooled. Subsamples were then drawn and mounted on two microscope slides. Preparation of reference slides and fecal slides is described by Hansen and

<sup>1</sup>Data reported here were used in a thesis presented to the Department of Zoology and Physiology, University of Wyoming, in partial fulfillment of requirements for the degree of Master of Science.

<sup>2</sup>Biological Technician, located at Laramie, in cooperation with the University of Wyoming; Station's central headquarters is maintained at Fort Collins, in cooperation with Colorado State University.

Flinders (1969) and Ward (1970). Identification of plant species was based on cell shape and epidermal characteristics following the procedures of Davies (1959), Brusven and Mulkern (1960), and Storr (1961). Only plant fragments that consisted of epidermal tissue were recorded as indicating the presence of a species. Frequency percentages for each species in the diet were determined by examining 50 microscope points at 100X on each of the two slides prepared for each sample period.

## Results

Although mule deer consume a variety of vegetation annually, the major part of the diet is composed of only a few browse species (table 1). Deer diets vary considerably from one season to another.

### Winter Food Habits

During winter, mule deer fed on dry, rocky, south-facing slopes which support a minimum of vegetation. Feeding sites were generally dominated by either big sagebrush or by true mountainmahogany. During the winter of 1971-72, fecal samples were collected from areas dominated by big sagebrush and antelope bitterbrush. No vegetation analyses were made. The following winter was relatively severe, and as a result fecal samples were collected only from areas dominated by true mountainmahogany. Vegetation analyses for ground-cover estimates on this type of feeding site showed 8 percent browse, 5 percent graminoids, 0.8 percent forbs, and 86.2 percent bare ground (fig. 1).

A total of 154 fecal samples was collected during December, January, and February for 2 consecutive

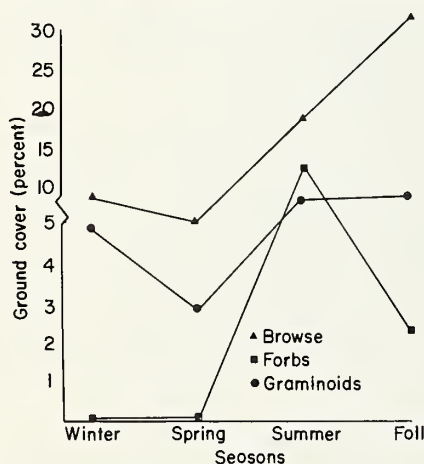


Figure 1.—Seasonal availability (percent ground cover) on mule deer feeding sites in southeastern Wyoming from June 1972 through May 1973.

years. Samples collected the winter of 1971-72 from areas dominated by big sagebrush and antelope bitterbrush showed the diet to be made up largely of browse species (fig. 2), with big sagebrush, antelope bitterbrush, and common juniper (*Juniperus communis*) the most important. Creeping barberry (*Berberis repens*) was frequently taken, but only in small amounts. Use of other browse was minor and occasional.

The following winter, samples collected from areas that consisted largely of true mountainmahogany showed true mountainmahogany to account for as much as 60 percent of the diet in January. Big sagebrush made up a large part of the diet, even though it was not readily available.

Forb use during winter was small. Two species western yarrow (*Achillea lanulosa*) and fringed sage-wort (*Artemisia frigida*) were found consistently in the diet. Use of graminoids was also small, amounting to less than 3 percent of the overall diet.

### Spring Food Habits

Spring feeding sites were found in a variety of vegetation types. During the second spring, however, winter conditions persisted until May. Deer remained in wintering areas until late spring, resulting in a high-browse low-graminoid utilization for this period. Ground cover of feeding sites was measured in the spring of 1973 only. These sites, of the true mountainmahogany type, consisted of 6.6 percent browse, 3.6 percent graminoids, 0.2 percent forbs, and 89.6 percent bare ground.

Analyses of 61 fecal samples collected during March, April, and May for 2 consecutive years showed an average of 84.5 percent browse in the diet.

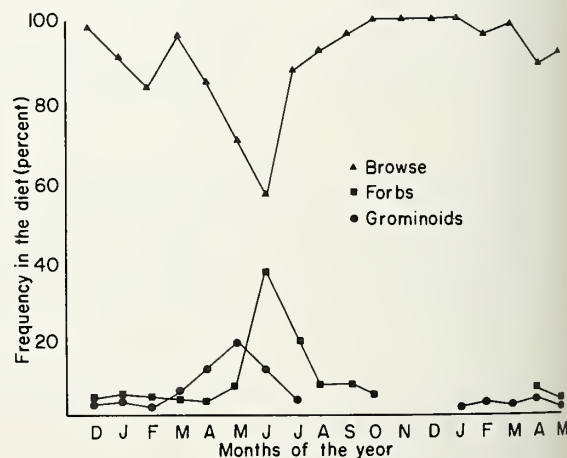


Figure 2.—Total monthly average of forage classes utilized by mule deer in southeastern Wyoming from December 1971 through May 1973, as determined by fecal analyses.



Table 1.—Mule deer food habits, as determined by fecal analyses of 328 samples collected from December 1971 through May 1973 (expressed as percent frequency of occurrence)

Plant species	Winter <sup>1</sup>	Spring	Summer	Fall	Winter <sup>2</sup>	Spring <sup>2</sup>
<b>BROWSE</b>						
<i>Acer glabrum</i>			1.0	1.0		
<i>Amelanchier alnifolia</i>			2.0	1.0	1.0	1.0
<i>Arctostaphylos uva-ursi</i>	3.0	1.0	1.0		1.0	2.0
<i>Artemisia tridentata</i>	33.0	28.0	23.0	28.0	20.0	18.0
<i>Berberis repens</i>	14.0	5.0	2.0		3.0	2.0
<i>Cercocarpus montanus</i>		15.0	13.0	8.0	50.0	46.0
<i>Chrysothamnus</i> sp.	5.0	1.0	1.0	10.0	5.0	4.0
<i>Juniperus communis</i>	7.0	10.0	5.0	8.0	10.0	9.0
<i>Pinus</i> sp.		1.0	1.0		1.0	
<i>Populus tremuloides</i>	1.0	1.0	2.0	1.0		
<i>Purshia tridentata</i>	20.0	10.0	5.0	25.0		2.0
<i>Ribes</i> sp.	2.0	1.0		3.0		
<i>Rosa</i> sp.		1.0	2.0			
<i>Salix</i> sp.	1.0	1.0		3.0		
<i>Shepherdia canadensis</i>		1.0	14.0		1.0	
<i>Symphoricarpos</i> sp.	2.0	1.0				
<i>Vaccinium scoparium</i>			1.0			
Unidentified	5.0	4.0	3.0	4.0	4.0	5.0
Totals	93.0	81.0	76.0	92.0	96.0	89.0
<b>FORBS</b>						
<i>Achillea lanulosa</i>	2.0	1.0	3.0	1.0	2.0	2.0
<i>Antennaria</i> sp.		1.0				
<i>Artemisia frigida</i>	1.0	1.0	2.0	6.0	1.0	2.0
<i>Astragalus</i> sp.			1.0			
<i>Cerastium arvense</i>			1.0			
<i>Descurainia richardsoni</i>			1.0			
<i>Erigeron</i> sp.			2.0			
<i>Lesquerella</i> sp.			2.0			
<i>Melilotus officinalis</i>			2.0			1.0
<i>Mertensia lanceolata</i>		1.0	1.0			
<i>Sedum stenopetalum</i>			1.0			
<i>Senecio</i> sp.				1.0		
<i>Taraxacum officinale</i>			1.0			
<i>Thlaspi alpestre</i>		1.0				
Unidentified			1.0			
Totals	3.0	5.0	18.0	8.0	3.0	5.0
GRAMINOID TOTALS	4.0	15.0	7.0		2.0	6.0

<sup>1</sup>Samples collected from areas of predominantly *Artemisia tridentata*.

<sup>2</sup>Samples collected from areas of predominantly *Cercocarpus montanus*.

Big sagebrush, true mountainmahogany, and common juniper made up over half of the total browse consumed.

Forb use remained low. The important species were lanceleaf bluebells (*Mertensia lanceolata*), groundsel (*Senecio* sp.), and field cerastium (*Cerastium arvense*).

Graminoids received their most intensive use during spring. Use amounted to 19 percent in May of 1972, even though this is a period of low availability. This reflects the "green-up" period, and marks the first seasonal change in diet.

### Summer Food Habits

Analyses of ground cover on summer feeding sites showed 18 percent browse, 8.3 percent graminoids, 10.6 percent forbs, and 63.1 percent bare ground. These analyses showed that use is concentrated in areas of high browse composition. Forb availability reached its highest level during early summer. Graminoid availability was high, but many plants were mature and usually with seed heads.

Fifty-four fecal samples were collected during June, July, and August. Browse ranked as the most important vegetation group, with big sagebrush contributing the most. Antelope bitterbrush, common juniper, and russet buffaloberry (*Shepherdia canadensis*) were of lesser importance.

Forb utilization was greatest during the summer; forbs represented 36 percent of overall use in June, but dropped significantly in July and August. Fringed sagewort, western yarrow, bladder pod (*Lesquerella* sp.) and yellow sweetclover (*Melilotus officinalis*) made up the largest percentage of summer use. This summer increase was in response to the "greening-up" of forbs in early summer.

Graminoid utilization was still high during early summer, representing 11.5 percent of the diet in June. Use decreased through July, and in August few graminoids were utilized.

### Fall Food Habits

Ground-cover analyses of fall mule deer feeding sites showed a return to areas of highest browse availability: 32.5 percent browse, 8.7 percent graminoids, 2.2 percent forbs, and 56.6 percent bare ground. Snow cover in the late fall contributed to low forb availability and relatively high browse availability.

During September, October, and November, 59 fecal samples were collected. Browse use had increased to a level comparable to that of winter. Big sagebrush and antelope bitterbrush were the most important species, representing over half of the total browse use. Antelope bitterbrush was consumed in larger amounts than big sagebrush during early fall

while it was still green, but by late fall its use had declined considerably. Common juniper and rabbitbrush (*Chrysothamnus* sp.) were also consumed, but in smaller amounts.

Forb use decreased from that during summer. The major forbs taken during the fall were western yarrow and fringed sagewort. Utilization of graminoids amounted to an average of less than 1 percent.

### Conclusions

Food habits data collected over a 17-month period indicates that areas of sagebrush and true mountainmahogany are essential to mule deer populations. Graminoids and forbs are valuable during certain times of the year; however, shrub species are highly valuable throughout the year, especially during the critical winter period. This study would indicate that if mule deer populations are to be maintained, managers need to practice intensive management of these important areas as competition for land use increases.

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